

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

SPECIFICATION

**INVENTION:** ELECTRONIC CONTROL UNIT AND METHOD FOR THE  
AUTOMATIC ACTIVATION OF THE PARKING BRAKE  
IN MOTOR VEHICLES

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ELECTRONIC CONTROL UNIT AND METHOD FOR THE AUTOMATIC  
ACTIVATION OF THE PARKING BRAKE IN MOTOR VEHICLES

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application claims the priority of German Application No. 100 37 576.6, filed August 2, 2000, the disclosure of which is expressly incorporated by reference herein.

[0002] The invention relates to an electronic control unit and method for the automatic activation of a parking brake in a motor vehicle.

[0003] From German patent document DE 196 25 019 A1, for example, an electronic control unit is known in the form of a transmission control device, which in addition to other vehicle functions is used for the automatically activating a parking brake in a vehicle. The parking brake is automatically activated independent of at least one specified operating mode of the motor vehicle, which is started with a mechanical ignition key. Such an operating state can include, e.g., falling short of a certain vehicle speed threshold, the position of the ignition key in the lock, and/or the state of the vehicle door (open/closed). At the latest, upon removing the ignition key from the lock, however, the parking brake is activated.

[0004] In the future, key-less access and/or driving authorization systems will be used increasingly in order to start motor vehicles. Such a system is known, for example, from the electronic authorization verification device from German Patent documents DE 198 01 064 A1 and DE 198 23 707 A1. Here, wireless code transmission takes place to establish the access and driving authorization. A mechanical ignition key is only provided as a redundant feature. The vehicle is then started and turned off with a rotary switch with simultaneous verification of the authorization through the authorization verification device. After shutting the vehicle off, no mechanical key, therefore, has to be pulled out of the ignition.

[0005] Nevertheless, automatic activation of a parking brake with a removed key, wherein an electronic authorization verification device should be considered equal to a conventional key system from a functional point of view, is required by law in some countries. For safety reasons, on vehicles without mechanical keys, the parking brake is therefore automatically activated independently of a key position in dependence of at least one other operating parameter or operating state. Operating parameters or signals that indicate the user has left the vehicle in particular are evaluated, such as an open driver's door (can be interrogated

with a switch in the door) or an empty driver's seat (can be recognized with seat occupation sensors).

[0006] The goal of the invention is to define an optimal operating mode at which the parking brake is activated automatically.

[0007] This goal is achieved by an electronic control unit and method for automatically activating a parking brake in dependence of at least one specified operating parameter or operating mode of a motor vehicle, which can be started without a mechanical key. The operating mode for a basic automatic activation of the parking lock is the fact that the internal combustion engine is being shut off. Beneficial embodiments of the invention are the objects of the dependent patent claims.

[0008] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

#### **BRIEF DESCRIPTION OF THE DRAWING**

[0009] Figure 1 is a schematic block diagram of the apparatus according to the present invention.

#### DETAILED DESCRIPTION OF THE DRAWING

[0010] Referring to the Figure, the invention relates, in particular, to vehicles with electronic access and driving authorization systems. In these vehicles 10, mechanical keys are no longer used and, thus, no key can be removed from the vehicle ignition. Such access and driving authorization systems include, for example, magnetic cards carried by the driver, which communicate with an authorization verification device installed in the vehicle (e.g. via radio). Generally, the parking brake 12 (preferably achieved by engaging the parking position in the case of an automatic transmission or by engaging a hand brake) should be activated automatically upon shutting-off the internal combustion engine 14. The selection of this operating state 15 as a criterion for automatically engaging the parking brake 12 has proven to be convenient and safe since an internal combustion engine that is shut-off generally points to the fact that the vehicle 10 should no longer be moved. On the other hand, however, in the case of an error, deactivation of the parking brake can be achieved quickly by re-starting the internal combustion engine.

[0011] If, as an exception, e.g., the parking brake is not supposed to be engaged with these operating parameters or

operating modes, then the driver must first consciously signal this via his actions. For this purpose, means 16, 18 that are actuated directly or indirectly by the driver are provided. These means interact with the electronic control unit 20 for the automatic activation of the parking brake 12. These means preferably cause a function that is comparable to leaving a mechanical ignition key in the lock.

[0012] In accordance with a first possibility, a key button 16 that must be directly manually actuated, such as in the form of an OFF switch, is connected with the electronic control unit 20 for the arbitrary prevention of the automatic activation of the parking brake. The driver actuates the OFF switch, which turns off, for example, the electronic access/driving authorization system. This means, e.g., that an authorization verification device (e.g. wireless communicating magnetic card) is deactivated. Therefore, the vehicle can no longer be locked either. The function of this electronic access and/or driving authorization system is assigned, for example, to a memory within the vehicle (similar to the memory known from German Patent document DE 198 23 707 A1, which is additionally fastened in a shaft), which remains in the vehicle. The function of the electronic "key" therefore remains in the vehicle. This corresponds to leaving a key in the ignition, which naturally causes the driver to

stay particularly alert. The driver preferably receives a notification that the parking brake is not now engaged and that the vehicle cannot be locked with the electronic "key". Furthermore, in this situation, for example, removal of the memory within the vehicle can lead to an automatic activation of the parking brake and cause the vehicle to be locked. Such an OFF key button (e.g. OFF switch) can be provided, e.g., freely accessible in the dashboard, the center console, the inside roof lining, or on the memory within the vehicle and can be equipped with an appropriate symbol. By actuating the OFF switch again, the described function can be deselected to prevent activation of the parking brake. De-selection of the described function, however, can also be performed automatically with a specified logic, e.g., through a query of the door contacts and the seat occupation or when starting the engine.

[0013] In accordance with a second possibility, based on which the motor vehicle can be started with an electronic authorization verification device with a wireless code transmission 18, the arbitrary prevention of the automatic activation of the parking brake can be triggered by inserting the authorization verification device in a holding shaft 18 provided for this purpose. For example, a switch is indirectly manually actuated when the authorization

verification device is inserted in the holding shaft 18. Such an authorization verification device can be a magnetic card, for example. A holding shaft that is already provided for another module can be used, for example. In the case of an authorization verification device in accordance with German Patent document DE 198 23 707 A1, the authorization verification device, e.g., in the form of a magnetic card, can be inserted into the shaft of the device to hold additional memory after prior removal. Such an electronic "key", e.g., in the form of a magnetic card, a transponder or additional memory, must, therefore, be stored at a specified location on the vehicle. This function also corresponds to leaving the key in the ignition.

[0014] Based on this invention, an electronic access and driving authorization system can be combined comfortably with the requirements of the function known under the term 'key interlock'.

[0015] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be



construed to include everything within the scope of the  
appended claims and equivalents thereof.